STRUCTURAL - GENERAL NOTES

GENERAL REQUIREMENTS

GOVERNING CODE: The design and construction of the structural aspects of this project is governed by the **"International Building Code (IBC)", 2012 Edition**, hereafter referred to as the IBC, as adopted and modified by the State of Montana understood to be the Authority Having Jurisdiction (AHJ).

REFERENCE STANDARDS: Refer to Chapter 35 of 2012 IBC. Where other Standards are noted in the drawings, use the latest edition of the standard unless a specific date is indicated. Reference to a specific section in a code does not relieve the contractor from compliance with the entire standard.

DEFINITIONS: The following definitions cover the meanings of certain terms used in these notes:

- **"Architect/Engineer"** – The Architect of Record and the Structural Engineer of Record.
- **"Structural Engineer of Record" (SER)** – The structural engineer who is licensed to stamp & sign the structural documents for the project. The SER is responsible for the design of the Primary Structural System.
- **"Submit for review"** - Submit to the Architect/Engineer for review prior to fabrication or construction.
- **"Per Plan"** – Indicates references to the structural plans, elevations and structural general notes.

OTHER DRAWINGS: Refer to the architectural drawings for additional information including but not limited to: dimensions, elevations, slopes, finishes, waterproofing, railings, stair plans, detail locations, and non-structural items.

STRUCTURAL DETAILS: The structural drawings are intended to show the general character and extent of the project and are not intended to show all details of the work. Use entire detail sheets and specific details referenced in the plans as "typical" wherever they apply. Similarly, use details on entire sheets with "typical" in the name wherever they apply.

STRUCTURAL RESPONSIBILITIES: The structural engineer (SER) is responsible for the strength and stability of the primary structure in its completed form.

COORDINATION: The Contractor is responsible for coordinating details and accuracy of the work; for confirming and correlating all quantities and dimensions; for selecting fabrication processes; for techniques of assembly; and for performing work in a safe and secure manner.

MEANS, METHODS and SAFETY REQUIREMENTS: The contractor is responsible for the means and methods of construction and all job-related safety standards such as OSHA and DOSH (Department of Occupational Safety and Health). The contractor is responsible for means and methods of construction related to the intermediate structural conditions (i.e. movement of the structure due to moisture and thermal effects; construction sequence; temporary bracing, etc).

CONSTRUCTION LOADS: Loads on the structure during construction shall not exceed the design loads as noted in DESIGN CRITERIA & LOADS below or the capacity of partially completed construction as determined by the Contractor's SSE for Bracing/Shoring.

NOTE PRIORITIES: Plan and detail notes and specific loading data provided on individual plans and detail drawings supplements information in the Structural General Notes.

DISCREPANCIES: In case of discrepancies between the General Notes, Specifications, Plans/Details or Reference Standards, the Architect/Engineer shall determine which shall govern. Discrepancies shall be brought to the attention of the Architect/Engineer before proceeding with the work. Should any discrepancy be found in the Contract Documents, the Contractor will be deemed to have included in the price the most expensive way of completing the work, unless prior to the submission of the price, the Contractor asks for a decision from the Architect as to which shall govern. Accordingly, any conflict in or between the Contract Documents shall not be a basis for adjustment in the Contract Price.

SITE VERIFICATION: The contractor shall verify all dimensions and conditions at the site. Conflicts between the drawings and actual site conditions shall be brought to the attention of the Architect/Engineer before proceeding with the work.

ALTERNATES: Alternate products of similar strength, nature and form for specified items may be submitted with adequate technical documentation (proper test report, etc.) to the Architect/Engineer for review. Alternate materials that are submitted without adequate technical documentation or that significantly deviate from the design intent of materials specified may be returned without review. Alternates that require substantial effort to review will not be reviewed unless authorized by the Owner.

DESIGN CRITERIA AND LOADS

DESIGN LIVE LOADS	AREA	LIVE LOADS (PSF) UNO	REMARKS & FOOTNOTES
	Handrails & Pedestrian Guardrails	50 PLF or 200 LB	(1)
	Stairs & Exits	100 PSF or 300 LB	Stair treads per note (2)
	Corridors	100	

(1) Top rail shall be designed to resist 50 PLF line load or 200 lb point load applied in any direction at any point. Intermediate rails (all those except the handrail), balusters and panel fillers shall be designed to withstand a horizontally applied normal load of 50 LB on an area not to exceed 1 ft square. These three loads are to be considered separately with worst case used for design.
(2) Place 300 lb concentrated load over 2"x2" area at any point to produce maximum stress. Area load and concentrated load are to be considered separately with worst case used for design.

SUBMITTALS

SUBMIT FOR REVIEW: SUBMITTALS of shop drawings, and product data are required for items noted in the individual materials sections and for *bidder designed* elements.

SUBMITTAL REVIEW PERIOD: Submittals shall be made in time to provide a minimum of TWO WEEKS or 10 WORKING DAYS for review by the Architect/Engineer prior to the onset of fabrication.

GENERAL CONTRACTOR'S PRIOR REVIEW: Prior to submission to the Architect/Engineer, the Contractor shall review the submittal for completeness. Dimensions and quantities are not reviewed by the SER, and therefore, must be verified by the General Contractor. Contractor shall provide any necessary dimensional details requested by the Detailer and provide the Contractor's review stamp and signature before forwarding to the Architect/Engineer.

SHOP DRAWING REVIEW: Once the contractor has completed his review, the SER will review the submittal for general conformance with the design concept and the contract documents of the building and will stamp the submittal accordingly. Markings or comments shall not be construed as relieving the contractor from compliance with the project plans and specifications, nor departures there from. The SER will return submittals in the form they are submitted in (either hard copy or electronic). For hard copy submittals, the contractor is responsible for submitting the required number of copies to the SER for review.

SHOP DRAWING DEVIATIONS: When shop drawings (component design drawings) differ from or add to the requirements of the structural drawings they shall be designed and stamped by the responsible SSE.

CAST-IN-PLACE CONCRETE

REFERENCE STANDARDS: Conform to:
(1) ACI 301-10 "Specifications for Structural Concrete"
(2) IBC Chapter 19 "Concrete"
(3) ACI 318-11/318R-11 "Building Code Requirements for Structural Concrete"
(4) ACI 117-10 "Specifications for Tolerances for Concrete Construction and Materials"

CONCRETE MIXTURES: Conform to ACI 301 Section 4 "Concrete Mixtures" and IBC Section 1904.2.

MATERIALS: Conform to ACI 301 Section 4.2.1 "Materials" for requirements for cementitious materials, aggregates, mixing water and admixtures.

SUBMITTALS: Provide all submittals required by ACI 301 Section 4.1.2. Submit mix designs for each mix in the table below. Substantiating strength results from past tests shall not be older than 24 months per ACI 318 Section 5.3.

TABLE OF MIX DESIGN REQUIREMENTS

Cast-in-Place Concrete Requirements	Strength f'c (psi)	Test Age (days)	Maximum Aggregate	Max W/C Ratio	Air Content
	3000	28	1"	0.5	5%

Table of Mix Design Requirements Notes:

(1) W/C Ratio: Water–cementitious material ratios shall be based on the total weight of cementitious materials. Maximum ratios are controlled by strength noted in the Table of Mix Design Requirements and durability requirements given in ACI 318 Section 4.3.

(2) Cementitious Materials:
a. The use of fly ash, other pozzolans, silica fume, or slag shall conform to ACI 318 Sections 4.3.1 and 4.4.2. Maximum amount of fly ash shall be 25% of total cementitious content unless re-viewed and approved otherwise by SER.
b. For concrete used in elevated floors, minimum cementitious-materials content shall conform to ACI 301 Table 4.2.2.1. Acceptance of lower cement content is contingent on providing supporting data to the SER for review and acceptance.
c. Cementitious materials shall conform to the relevant ASTM standards listed in ACI 318 Section 3.2.1.

(3) Air Content: Conform to ACI 318 Section 4.4.1. Minimum standards for exposure class are noted in the table. If freezing and thawing class is not noted, air content given is that required by the SER. Tolerance is ±1-½%. Air content shall be measured at point of placement.

(4) Aggregates shall conform to ASTM C33.

(5) Slump: Conform to ACI 301 Section 4.2.2.2. Slump shall be determined at point of placement.

MEASURING, MIXING, AND DELIVERY: Conform to ACI 301 Section 4.3.

HANDLING, PLACING, CONSTRUCTING AND CURING: Conform to ACI 301 Section 5. In addition, hot weather concreting shall conform to ACI 305.1-06 and cold weather concreting shall conform to ACI 306.1-90.

EMBEDDED ITEMS: Position and secure in place expansion joint material, anchors and other structural and non-structural embedded items before placing concrete. Contractor shall refer to mechanical, electrical, plumbing and architectural drawings and coordinate other embedded items.

GROUT: Non-metallic, shrinkage-resistant grout: ASTM C 1107/C 1107M, factory-packaged, non-metallic aggregate grout, non-corrosive and non-staining, mixed with water to consistency suitable for application and a 30-minute working time.

CONCRETE REINFORCEMENT

REFERENCE STANDARDS: Conform to:
(1) ACI 301-10 "Standard Specifications for Structural Concrete", Section 3 "Reinforcement and Reinforcement Supports."
(2) ACI SP-66-04 "ACI Detailing Manual" including ACI 315-99 "Details and Detailing of Concrete Reinforcement."
(3) CRSI MSP-09, 28th Edition, "Manual of Standard Practice."
(4) ANSI/AWS D1.4 "Structural Welding Code - Reinforcing Steel."
(5) IBC Chapter 19-Concrete.
(6) ACI 318-11 "Building Code Requirements for Structural Concrete."
(7) ACI 117-10 "Specifications for Tolerances for Concrete Construction and Materials"

MATERIALS:
Reinforcing Bars ..... ASTM A615, Grade 60, deformed bars.
Weldable Reinforcing Bars ..... ASTM A706, Grade 60, deformed bars.
Smooth Welded Wire Fabric ..... ASTM A185
Deformed Welded Wire Fabric ..... ASTM A497
Bar Supports ..... CRSI MSP-09, Chapter 3 "Bar Supports."
Tie Wire ..... 16 gage or heavier, black annealed.

FABRICATION: Conform to ACI 301, Section 3.2.2. "Fabrication", and ACI SP-66 "ACI Detailing Manual."

WELDING: Bars shall not be welded unless authorized.

PLACING: Conform to ACI 301, Section 3.3.2 "Placement." Placing tolerances shall conform to ACI 117.

CONCRETE COVER: Conform to the following cover requirements unless noted otherwise in the drawings.
Concrete cast against earth ..... 3"
Concrete exposed to earth or weather ..... 2"
Ties in columns and beams ..... 1-½"
Bars in slabs ..... ¾"
Bars in walls ..... ¾"

SPLICES: Conform to ACI 301, Section 3.3.2.7, "Splices".

FIELD BENDING: Conform to ACI 301 Section 3.3.2.8. "Field Bending or Straightening." Bar sizes #3 through #5 may be field bent cold the first time. Other bars require preheating. Do not twist bars. Bars shall not be bent past 45 degrees.

POST-INSTALLED ANCHORS (INTO CONCRETE AND NATIVE STONE)

REFERENCE STANDARDS: Conform to:
1) IBC Chapter 19 "Concrete"
2) ACI 318-11 "Building Code Requirements for Structural Concrete"

POST-INSTALLED ANCHORS: Install only where specifically shown in the details or allowed by SER. All post-installed anchors types and locations shall be approved by the SER and shall have a current ICC-Evaluation Service Report that provides relevant design values necessary to validate the available strength exceeds the required strength. Submit current manufacturer's data and ICC ESR report to SER for approval regardless of whether or not it is a pre-approved anchor. Anchors shall be installed in strict accordance to ICC-ESR and manufacturer's instructions. No reinforcing bars shall be damaged during installation of post-installed anchors. Anchor type, diameter and embedment shall be as indicated on drawings.

1. ADHESIVE ANCHORS: The following Adhesive-type anchoring systems have been used in the design and shall be used for anchorage to CONCRETE, as applicable and in accordance with corresponding current ICC ESR report. Drilled-in anchor embedment lengths shall be as shown on drawings, or not less than 7 times the anchor nominal diameter (7D).
   a. HILTI "HIT-HY 200 SAFESET" – ICC ESR-3187 for anchorage to CONCRETE with embedment depth less than or equal to 20 bar diameters, HILTI "HIT-HY 200" for anchorage to LIMESTONE with embedment indicated on plan
   b. HILTI "HIT-RE 500 SD" – ICC ESR-2322 for anchorage to CONCRETE with any embedment depth

STRUCTURAL STEEL

REFERENCE STANDARDS: Conform to:
1) IBC Chapter 22 – "Steel"
2) ANSI/AISC 303-10 – "Code of Standard Practice for Steel Buildings & Bridges"
3) AISC – "Manual of Steel Construction", Fourteenth Edition (2010)
4) ANSI/AISC 360-10 – "Specification for Structural Steel Buildings"
5) AWS D1.1:2010 – "Structural Welding Code – Steel"
6) 2009 RCSC – "Specification for Structural Joints using High-Strength Bolts"

MATERIALS:
All steel tubing and anchor rods to be 316 stainless per the architect.

WELDING:
1) Welding shall conform to AWS D1.1 and D1.6 with Prequalified Welding Processes except as modified by AISC 360 section J2. Welders shall be qualified in accordance with AWS D1.1 requirements.
2) Use 70ksi strength, low-hydrogen type electrodes (E7018) or E71T as appropriate for the process selected.
3) Welding of high strength anchor rods is prohibited unless approved by Engineer.

SYMBOLS USED AS ABBREVIATIONS:

&	AND
L ∠	ANGLE
LL ∠∠	DOUBLE ANGLE
@	AT
℄	CENTER LINE
//	PARALLEL
d	PENNY (NAIL)
⊥	PERPENDICULAR
℄	PLATE
#	POUND OR NUMBER
Ø	ROUND OR DIAMETER

ABBREVIATIONS:

(A)	
A/E	ARCHITECT/ENGINEER
AB	ANCHOR BOLT/ROD
ABV	ABOVE
ADDL	ADDITIONAL
ADDM	ADDENDUM
ADH	ADHESIVE
ADJ	ADJUSTABLE, ADJACENT, ADJOINING
AFF	ABOVE FINISH FLOOR
AGGR	AGGREGATE
AHR	ANCHOR, ANCHORAGE
ALT	ALTERNATE
APPROX	APPROXIMATE
**AR	ANCHOR ROD
ARCH	ARCHITECT (URAL)
(B)	
BEV	BEVELED
BFF	BELOW FINISH FLOOR
**BL	BRICK LEDGE
BLDG	BUILDING
BLW	BELOW
**BLK	BLOCK (ING)
BM	BEAM
BOT	BOTTOM
**BO	BOTTOM OF
**BOC	BOTTOM OF CONCRETE
**BOF	BOTTOM OF FOOTING
BRG	BEARING
**BRK	BRICK
BSMT	BASEMENT
BTWN	BETWEEN
BU	BUILT-UP
(C)	
C	CHANNEL
CAM"(C=)	CAMBER
CB	CARRIAGE BOLT
CU FT	CUBIC FEET OR FOOT
CHFR	CHAMFER
CIP	CAST-IN-PLACE
**CIPC	CAST-IN-PLACE CONCRETE
CJ	CONTROL JOINT
CL ℄	CENTER LINE
CLG	CEILING
CLR	CLEAR, CLEARANCE
CMU	CONCRETE MASONRY UNIT
COL	COLUMN
CONC	CONCRETE
CONN	CONNECT (ION)
CONSTR	CONSTRUCTION
CONT	CONTINUOUS, CONTINUE
CONTR	CONTRACT (OR)
COORD	COORDINATE
CTR	CENTER
CU	CUBIC
CU YD	CUBIC YARD
(D)	
D	DEEP, DEPTH
DBL	DOUBLE
DEMO	DEMOLITION, DEMOLISH
DET	DETAIL
DIA Ø	DIAMETER
DIAG	DIAGONAL, DIAGRAM
DIM	DIMENSION
DIR	DIRECTION
DIV	DIVIDE, DIVISION
**DKG	DECKING
DL	DEAD LOAD
DOUG FIR	DOUGLAS FIR
DR	DRAIN
DWG	DRAWING (S)
(E)	
**(E)	EXISTING (SEE EXIST)
EA	EACH
**EAB	EPOXY ANCHOR BOLT
EF	EACH FACE
EJ	EXPANSION JOINT
EL	ELEVATION
**EMB	EMBED (ED)
EPS	EXPANDED POLYSTYRENE (2")
EQ	EQUAL
EQUIP	EQUIPMENT
EST	ESTIMATE
EW	EACH WAY
EXIST	EXISTING
EXP	EXPANSION, EXPOSED
EXP BT	EXPANSION BOLT
EXT	EXTERIOR, EXTERNAL
(F)	
FD	FLOOR DRAIN
**FND	FOUNDATION
FF EL	FINISH FLOOR ELEVATION
FIN	FINISH (ED)
FLG	FLANGE
FLR	FILLER, FLOOR (ING)
**FO	FACE OF
FOC	FACE OF CONCRETE
FOM	FACE OF MASONRY
FOS	FACE OF STUD
**FOW	FACE OF WALL
FS	FAR SIDE
FT	FOOT, FEET
FTG	FOOTING
FRMG	FRAMING
FUT	FUTURE
(G)	
GA	GAGE, GAUGE
GALV	GALVANIZED
GC	GENERAL CONTRACTOR
**GL	GLUE LAMINATED (BEAM)
GLU LAM	GLUE LAMINATED (BEAM)
GR BM	GRADE BEAM
GRTG	GRATING
GYP	GYPSUM
GYP BD	GYPSUM BOARD
(H)	
H	HIGH
**HAB	HEADED ANCHOR BOLT
**HAS	HEADED ANCHOR STUD
HC	HOLLOW CORE
HDR	HEADER
HGR	HANGER
HORIZ	HORIZONTAL
HS	HIGH STRENGTH
**HSB	HIGH STRENGTH BOLT
**HSS	HOLLOW STRUCTURAL SHAPE
HT	HEIGHT
(I)	
ID	INSIDE DIAMETER
INCL	INCLUDE (D), INCLUDING
INFO	INFORMATION
INSUL	INSULATE (D), INSULATION
INT	INTERIOR
INV EL	INVERT ELEVATION
(J)	
**JST	JOIST
**JT	JOINT
(K)	
K	THOUSAND (KIP)
**KCJ	KEYED CONSTRUCTION JOINT
KIP	THOUSAND POUND
KLF	KIPS PER LINEAR FOOT
KSF	KIPS PER SQUARE FOOT
KSI	KIPS PER SQUARE INCH
(L)	
L	ANGLE
LAM	LAMINATE (ED)
**LB	POUND
LF	LINEAR FEET
**LGR	LEDGER
LL	LIVE LOAD
LLH	LONG LEG HORIZONTAL
LLV	LONG LEG VERTICAL
LOC	LOCATION
LONG	LONGITUDINAL
**LSL	LAMINATED STRAND LUMBER
LT WT	LIGHTWEIGHT
**LVL	LAMINATED VENEER LUMBER
(M)	
MACH	MACHINE
MB	MACHINE BOLT
MATL	MATERIAL
MAX	MAXIMUM
MBR	MEMBER
**MC	MISCELLANEOUS CHANNEL
MECH	MECHANICAL
MEZZ	MEZZANINE
MFD	MANUFACTURED
MFR	MANUFACTURER
MFR REC	MANUFACTURER'S RECOMMENDATION
MIN	MINIMUM
MISC	MISCELLANEOUS
MTL	METAL
(N)	
**(N)	NEW
NA	NOT APPLICABLE
NIC	NOT IN CONTRACT
NO	NUMBER
NOM	NOMINAL
NS	NEAR SIDE
NTS	NOT TO SCALE
(O)	
OC	ON CENTER
OD	OUTSIDE DIAMETER
OH DR	OVERHEAD DOOR
OPNG	OPENING
OPP	OPPOSITE
**OSB	ORIENTED STRAND BOARD
**OVS	OVERSIZED
(P)	
**PAF	POWDER ACTUATED FASTENER
PAR	PARALLEL
PCF	POUNDS PER CUBIC FOOT
PED	PEDESTAL
PERF	PERFORATED
PERP	PERPENDICULAR
PL ℄	PLATE
PLF	POUNDS PER LINEAR FOOT
PLYWD	PLYWOOD
PNL	PANEL
PR	PAIR, PIPE RAIL
PRCST	PRECAST CONCRETE
PREFAB	PREFABRICATE
PSF	POUNDS PER SQUARE FOOT
PSI	POUNDS PER SQUARE INCH
**PSL	PARALLEL STRAND LUMBER
PT	POST TENSION (ED), PRESSURE TREATED
PVC	POLYVINYL CHLORIDE
(R)	
R	RADIUS/RISE (R)
RCP	REINFORCED CONCRETE PIPE
REF	REFERENCE
REINF	REINFORCE (D), (ING)
REQ	REQUIRE
REQD	REQUIRED
REV	REVISION (S), REVISED
RO	ROUGH OPENING
RS	ROUGH SAWN
RVS	REVERSE (SIDE)
(S)	
SCHED	SCHEDULE
SECT	SECTION
SHT	SHEET
SHTHG	SHEATHING
SIM	SIMILAR
**SL	SNOW LOAD
SLNT	SEALANT
SLV	SLEEVE
**SOG	SLAB-ON-GRADE
SPEC	SPECIFICATION (S)
SQ	SQUARE
**SSL	SHORT SLOTTED (HOLE)
**SSLT	SHORT SLOTTED (HOLE) TRANSVERSE
SST	STAINLESS STEEL
STD	STANDARD
STIF	STIFFENER
STL	STEEL
STRUCT	STRUCTURAL
SUB FL	SUBFLOOR
SUSP	SUSPENDED
**SW	SHEAR WALL
SYMM	SYMMETRY, SYMMETRICAL
(T)	
T	TREAD
T&B	TOP AND BOTTOM
T&G	TONGUE AND GROOVE
**TBD	TO BE DETERMINED
THD	THREAD (ED) (S)
THK	THICKNESS
THRU	THROUGH
**TL	TOTAL LOAD
TO	TOP OF
TOB	TOP OF BEAM
TOC	TOP OF CONCRETE
TOF	TOP OF FOOTING
TOM	TOP OF MASONRY
TOP	TOP OF PIER
TO PAR	TOP OF PARAPET
TOS	TOP OF STEEL
TO SHTHG	TOP OF SHEATHING
TO SUB FL	TOP OF SUBFLOOR
TOW	TOP OF WALL
**TRANS	TRANSVERSE
TRTD	TREATED
TYP	TYPICAL
(U)	
UNO	UNLESS NOTED OTHERWISE
(V)	
**V	SHEAR
VERT	VERTICAL
VIF	VERIFY IN FIELD
VR	VAPOR RETARDER
VRFY	VERIFY
(W)	
W	WIDTH
W/	WITH
W/O	WITHOUT
**WA	WEDGE ANCHOR
WD	WOOD
WF (W)	WIDE FLANGE
WL	WIND LOAD
WLD	WELD (ED)
WP	WATERPROOFING, WORKING POINT
**WS	WALL STEP
WT	WEIGHT
WWF	WELDED WIRE FABRIC
(X)	
XPS	EXTRUDED POLYSTYRENE (1½")
(Y)	
YD	YARD

INDEX TO STRUCT SHEETS

Lewis and Clark Caverns State Park
Railing and Lighting Upgrade 2018
FWP #7176603

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P.O. Box 200701, 1522 Ninth Avenue
Helena, MT 59620-0701

Montana Fish, Wildlife & Parks

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drawn WCG | check by MMH

issue log
For Bidding 03/23/18

GENERAL NOTES

sheet
RSD-1.0

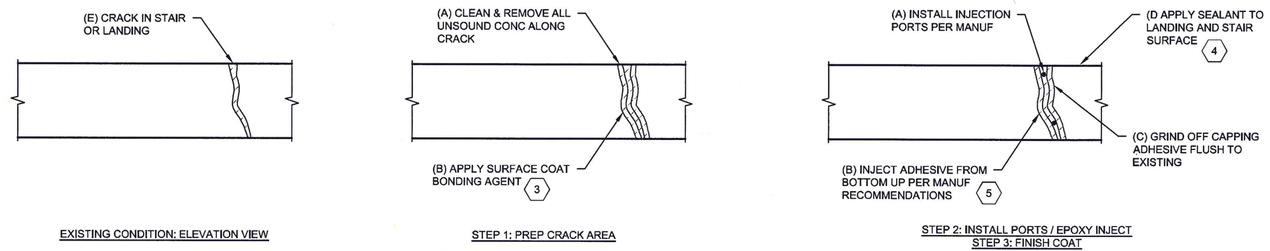
DCI ENGINEERS
ROCKING DESIGN PC ARCHITECTURE
101 E. BROADWAY, SUITE 612 MISSOULA, MONTANA 59802
PHONE: (406) 541-8647 www.rockingmdesign.com

CONCRETE REPAIR PRODUCT GUIDE:

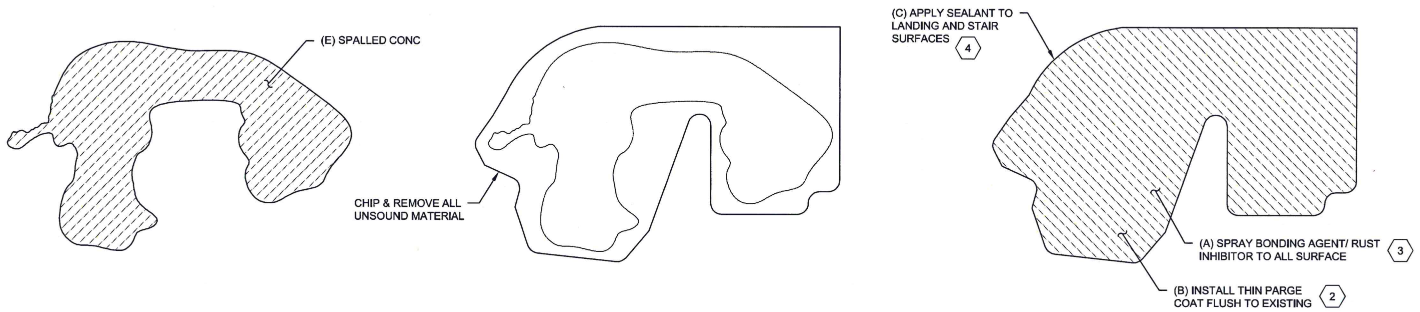
1	EUCOPATCH - FAST-SETTING PATCHING AND REPAIR MATERIAL
2	EUCOCRETE - FLOWABLE MEDIUM DEPTH PATCH MATERIAL
3	DURAL PREP AC - BONDING AGENT & ANTI-CORROSION COATING
4	BARACADE WB244 - WATER REPELLANT CONCRETE SEALER FOR ALL EXISTING STAIR AND LANDING SURFACES
5	DURALCRETE EPOXY SYSTEM - PRESSURE INJECTED HIGH STRENGTH EPOXY BONDING ADHESIVE FOR STRUCTURAL CRACK

NOTE:
ALL PRODUCTS NOTED ARE MANUFACTURED BY THE EUCLID CHEMICAL COMPANY. CONTRACTOR TO SUBMIT DATA SHEETS FOR ANY ALTERNATE PRODUCT OR MANUFACTURER. WRITTEN APPROVAL REQUIRED PRIOR TO BIDDING FOR ANY SUBSTITUTION.

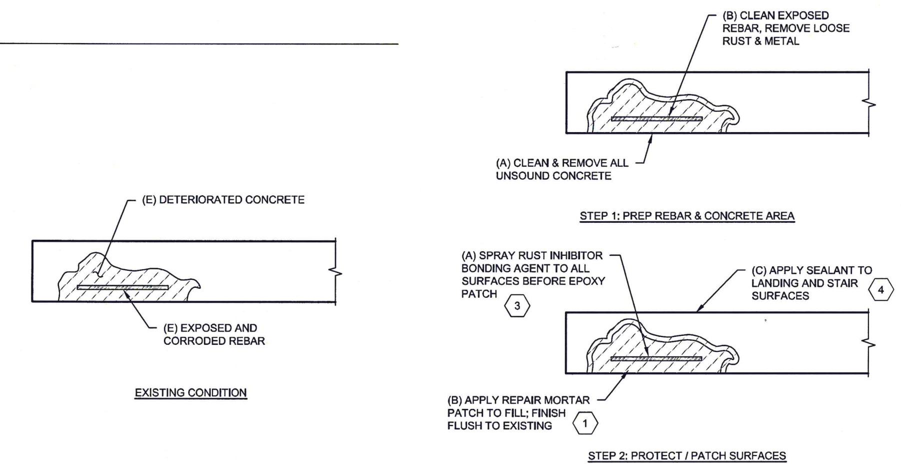
1 CONCRETE REPAIR PRODUCT GUIDE
SCALE: NTS



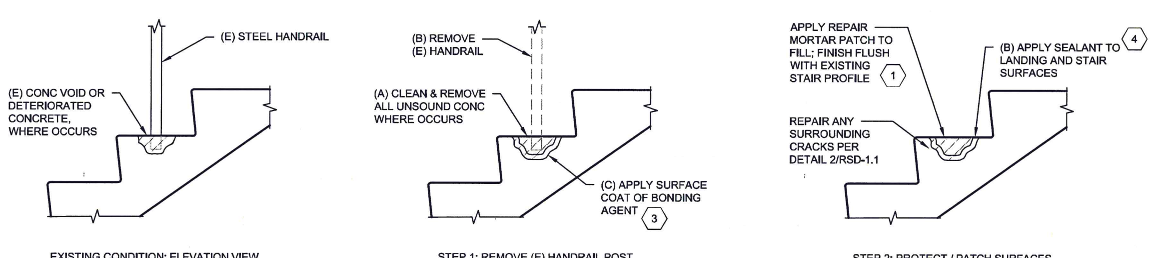
2 TYPICAL CRACK REPAIR
SCALE: NTS



3 TYPICAL SPALLING CONCRETE REPAIR
SCALE: NTS

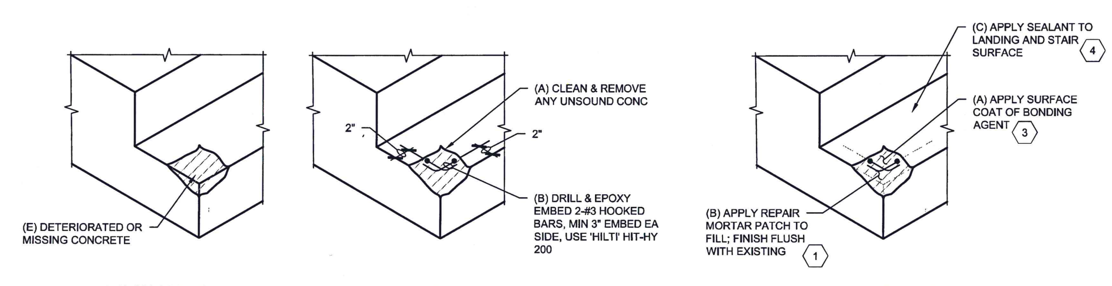


4 EXPOSED AND CORRODED REBAR REPAIR
SCALE: NTS



NOTE: USE SIMILAR DETAIL WHERE (E) HANDRAIL POST IS REMOVED AT LIMESTONE

5 TYP (E) HANDRAIL DEMO AND INFILL
SCALE: NTS



6 TYP REPAIR AT MISSING CONCRETE SECTION
SCALE: NTS

Lewis and Clark Caverns State Park
Railing and Lighting Upgrade 2018
FWP #7176603

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DETAILS

sheet
RSD-1.1

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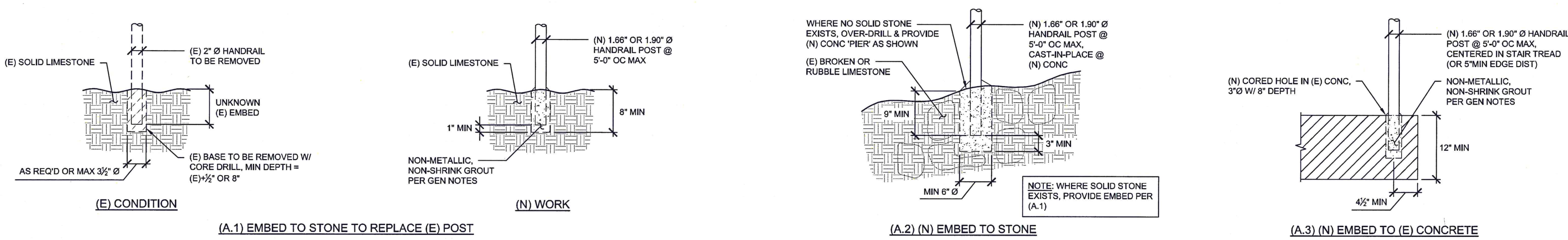
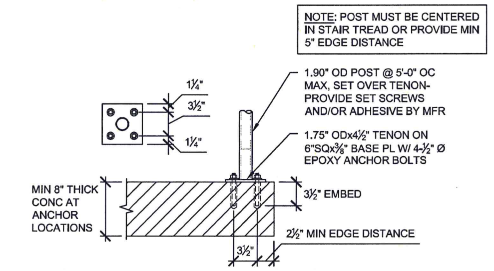
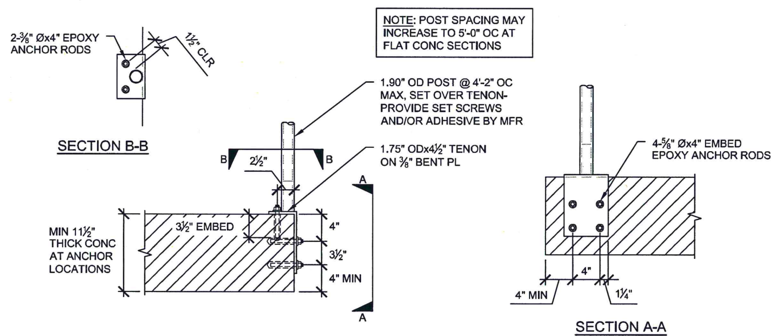


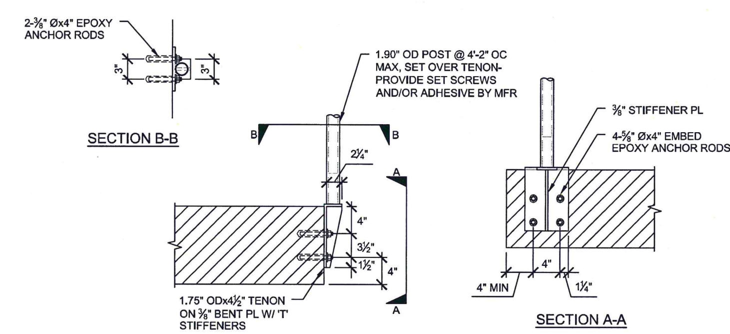
1 POST BASE DETAIL 'A'
SCALE: 1"=1'-0"



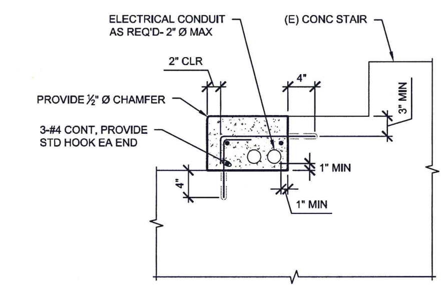
2 POST BASE DETAIL 'B'
SCALE: 1"=1'-0"



3 POST BASE DETAIL 'C'
SCALE: 1"=1'-0"



4 POST BASE DETAIL 'D'
SCALE: 1"=1'-0"



5 TREAD EXTENSION
SCALE: 1"=1'-0"

SEE ARCHITECTURAL DRAWINGS FOR ALL BASE CONNECTION LOCATIONS. CONTACT DCI IF FIELD CONDITIONS DO NOT MATCH THOSE SHOWN IN DETAILS

Lewis and Clark Caverns State Park
Railing and Lighting Upgrade 2018
FWP #7176603

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DETAILS

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RSD-1.2

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